Prospects for Energy Cooperation in Northeast Asia

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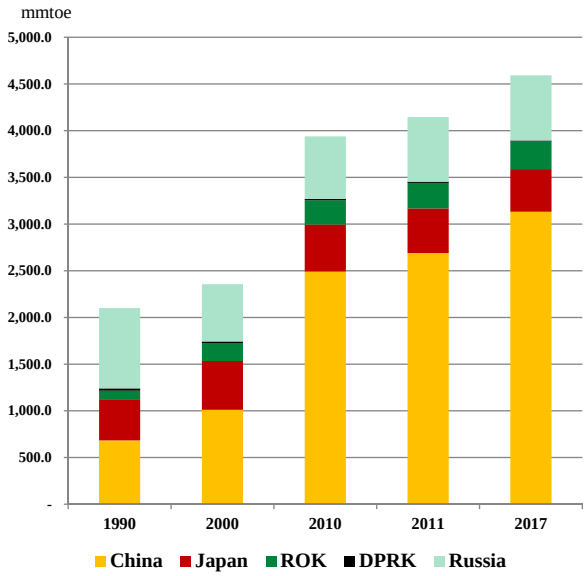
Energy Profiles in NEA

Rapid Growths in Energy Demand/Imports

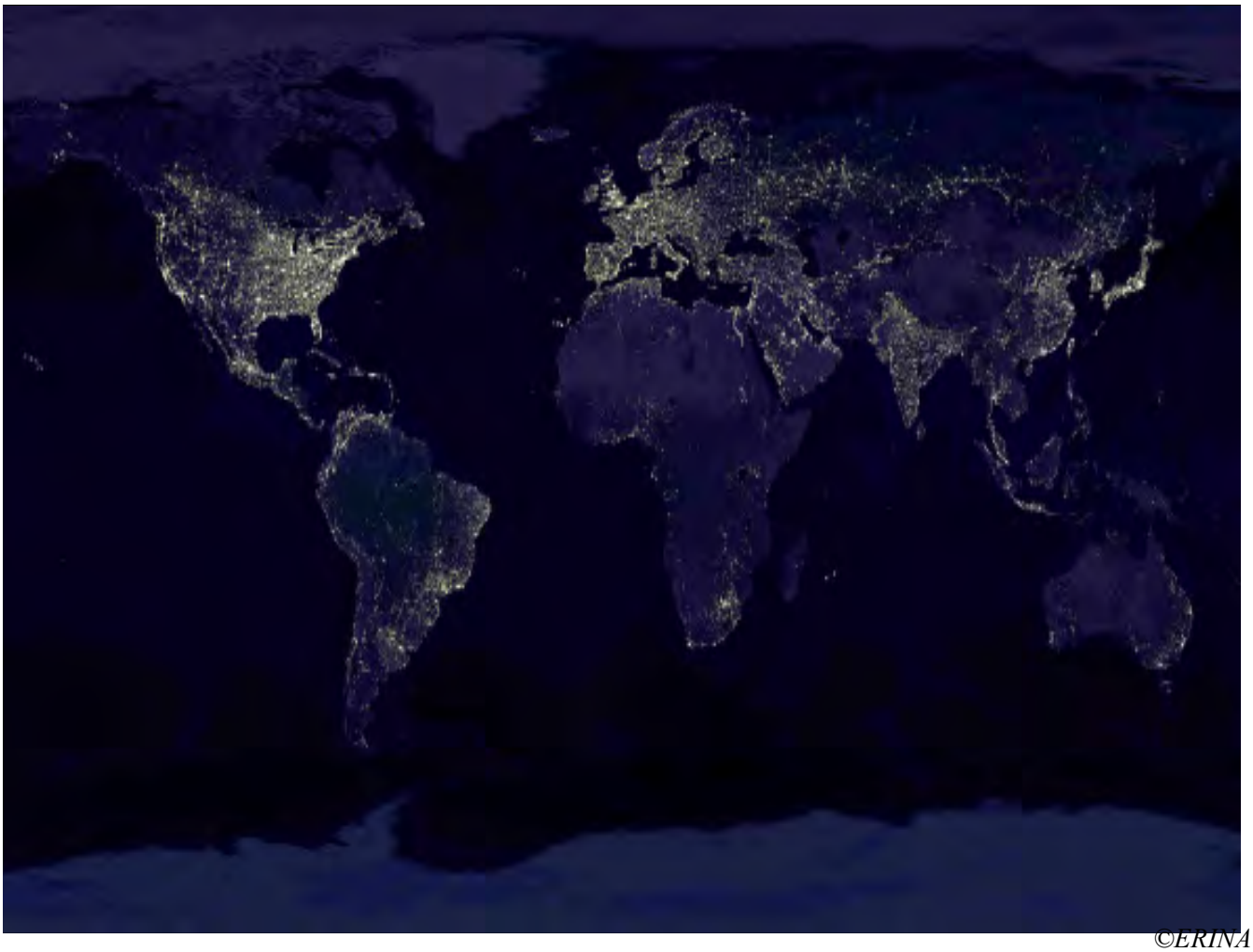
- **Demand increases: 2.2 times from 1990 to 2017**
  - **Contribution by China: 98 % of total regional increases.**
  - **Demand in DPRK and Russia decreased.**



Energy Demand in Northeast Asia (Unit: million toe)

	1990	2000	2010	2011	2017	2017 /1990	Contribution (%)
China	683.9	1,010.9	2,491.3	2,690.1	3,132.2	4.6	98.2%
Japan	441.3	522.3	503.8	477.8	456.4	1.0	0.6%
ROK	90.9	193.6	259.7	273.0	295.9	3.3	8.2%
DPRK	24.0	15.7	15.7	12.6	9.9	0.4	-0.6%
Russia	859.6	613.4	668.2	691.7	698.3	0.8	-6.5%
NEA Total	2,099.6	2,356.0	3,938.7	4,145.3	4,592.7	2.2	100.0%
NEA/World	25.9%	25.2%	32.5%	33.4%	34.0%		

Source: BP World Energy Statistics 2018 and Energy Info Korea for DPR Korea



Energy Profiles in NEA

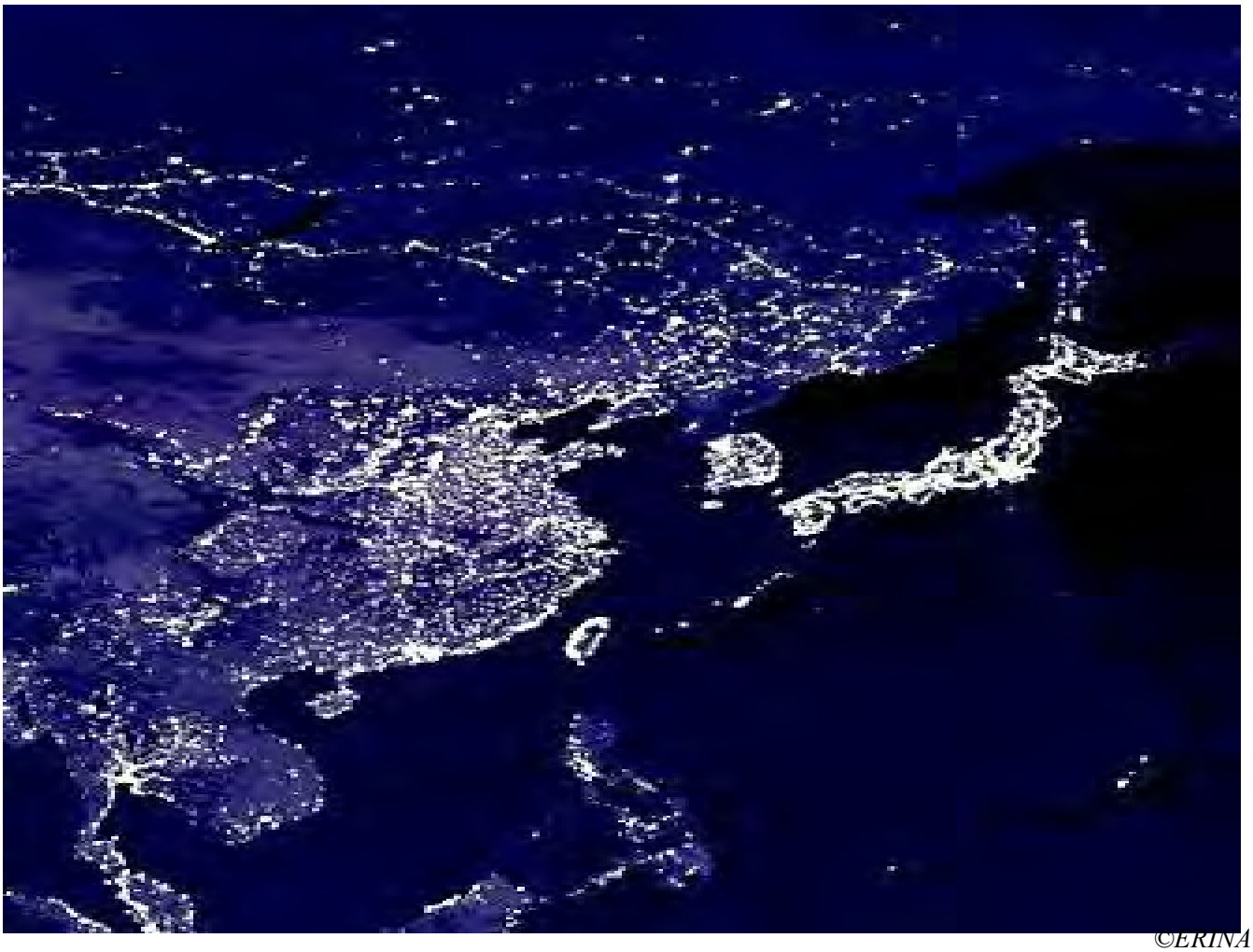
❑ Diversity in the energy sector over the countries

- **Energy per capita**
  - High in ROK, Japan and Russia
  - Low in PRK and China → High potential to continue to increase in energy demand in future
- **Net energy import region**
  - Russia is only an exporting country of oil and gas in the region.
  - Japan and ROK highly depend on imports in energy supply due to the lack of indigenous energy sources
  - China rapidly increases energy imports to meet the demand increase.
  - DPRK exports coal to China in recent years.
- **Difference in energy efficiency**
  - Japan's energy intensity is quite low compared with other countries in Northeast Asia, indicating a high energy efficiency in the country.
  - China, Russia, and DPRK show high energy intensity, less energy efficient structures.
- **Energy/Environmental diversity to the difference in energy mix.**
  - Due to significant dependence on coal in China and DPRK, carbon intensity to energy is high.
  - ROK and Russia show a relatively low carbon intensity, due to high shares of nuclear and natural gas in their energy mixes

Major Energy Indicators in Northeast Asia

	Unit	China	Japan	ROK	DPRK	Russia
Energy per capita	toe	2.15	3.35	5.51	0.35	5.02
Import dependency	%	18.9	93.9	94.0	-70.7	-85.3
Energy Intensity	toe/2010 USD	0.31	0.07	0.22	0.33	0.45
Carbon Intensity	tCO_2/Energy	3.06	2.7	2.09	2.88	1.96

Source: OECD iLibrary

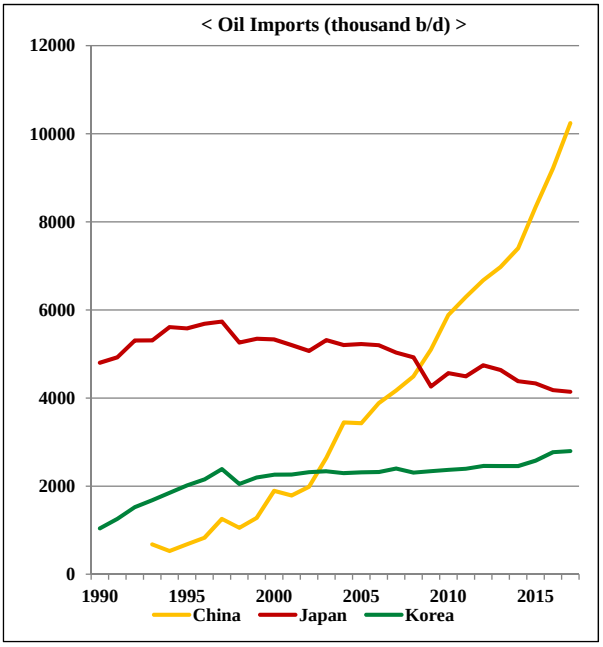


Energy Profiles in NEA - Oil

- **Significant increases in oil demand/imports**
  - **Japan, Korea and DPRK:**
    - No oil production → Supply totally depends on imports
    - High dependency on the Middle East in oil imports.

< ME dependency in oil imports >		
China	Japan	ROK
43.6%	85.8%	85.9%

  - **China: Largest importer of oil in the world**
    - Incremental demand increases have met by imports.
  - **Russia: Only net exporter of oil in the region**
    - Largest oil exporter in the world
    - Export size: 8.6 million barrel/day in 2017 = 12.7 % in world total oil exports
  - **The share of Northeast Asia in world oil trade increased to 24.1% (2017)**



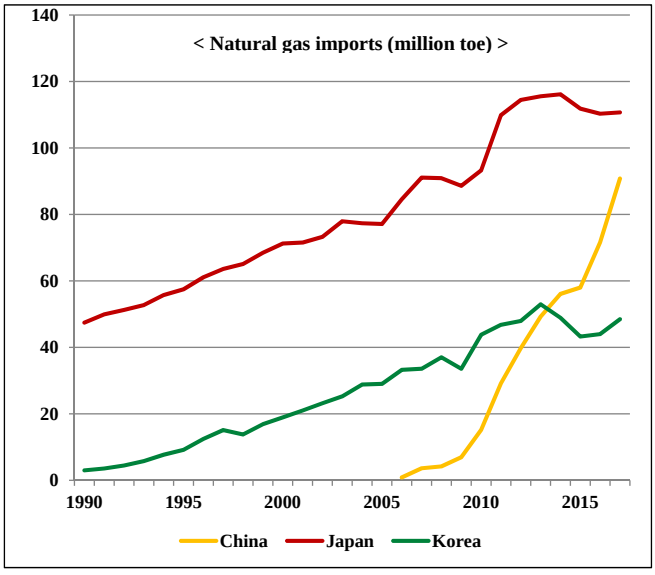
Source: BP World Energy Statistics 2018

Energy Profiles in NEA –Natural gas

- **Rapid increases in natural gas demand/imports**
  - LNG imports by Japan, Korea
  - China imports natural gas by the type of LNG as well as by pipelines.
- **Russia is the largest producer and exporter of natural gas in the world.**

Natural Gas Imports/Exports (bcm, 2017)				
Imports	*via* PNG	*via* LNG	Total	Share
Japan	-	113.9	113.9	10.0%
China	39.4	52.6	92.0	8.1%
ROK	-	51.3	51.3	4.5%
NE Share		47.7%	22.7%	
Exports	*via* PNG	*via* LNG	Total	Share
Russia	215.4	15.5	231.0	20.4%

Source: BP World Energy Statistics 2018

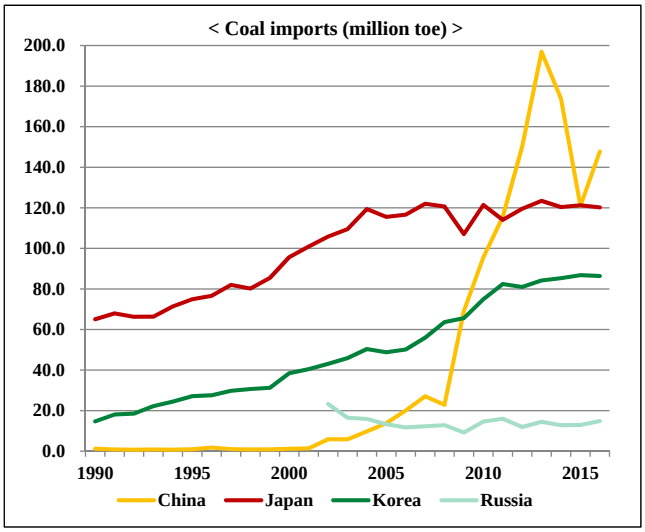


Energy Profiles in NEA - Coal

- **Largest region to produce and consume coal in the world**
  - **Rapid coal imports increase in China due to the electricity demand increases**
  - **Continuous coal demand increase in Japan and ROK**
    - **Coal demand in power generation, steel and cement industry**

Coal Production/Consumption in Northeast Asia			
Rank	**Producer**	**Size (mmtoe)**	**Share (%)**
1	China	1,747.2	46.4%
6	Russia	206.3	5.5%
Rank	**Consumer**	**Size (mmtoe)**	**Share (%)**
1	China	1,892.6	50.7%
4	Japan	120.5	3.2%
5	Russia	92.3	2.5%
6	ROK	86.3	2.3%

Source: BP World Energy Statistics 2018

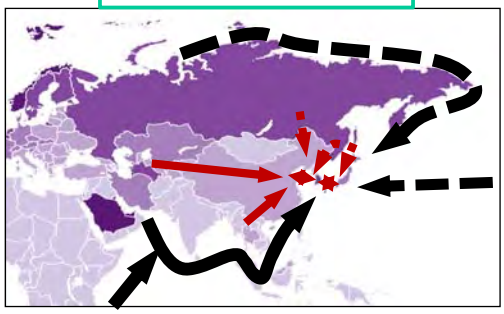


Source: U.S. Energy Information Administration

Energy Profiles in NEA – Energy Trades

- **Limited Cross-border Energy Transportation Infrastructures**
  - **No active energy trading through pipeline nor electricity power grids systems among the countries in Northeast Asia**
  - **Inter-state energy trades in Northeast Asia (NEA) are limited**
    - **Russia's share in oil imports: Japan 5.5%, China 14.2%, ROK 1.7%**
    - **Russia's share in gas imports: Japan 8.7%, China 1.2%, ROK 5.1%**

Energy Import Flow in NEA



Pipeline Network in Europe

- **No Institutionalized Framework to Implement Regional Energy Cooperation**
  - **Multilateral/Intra-regional level cooperation in Northeast Asia will be required.**

Regional Energy Cooperation Opportunity in NE Asia

- **Trade and investment opportunity**
  - **Facilitation of oil, gas, coal development in the region**
    - ✓ **Free and open investment policy**
  - **Construction/Development of cross-border energy transportation network infrastructure: Oil & Gas Pipelines, Power Grid, Railway & Port**
    - **<Russia – China>, <Russia- Japan>, and <Russia – DPRK – ROK>**

  ⇒ **Improvement of regional energy security capability & economics and efficiency + Common regional energy market + Enhancing intra-regional trades/investments**
- **Technology cooperation opportunity**
  - **Energy conservation/efficiency improvement**
  - **Renewable energy for green growth**
  - **Nuclear safety (Korea, China, Japan, Russia)**
  - **Non-conventional energy sources: Shale gas, CBM, Oil sand**
- **Solving Energy Poverty Problems**
  - **Commercial energy accessibility problem in DPRK**
- **Creation of Multilateral Framework for Regional Energy Cooperation**

Projects for Energy Cooperation in Northeast Asia

	Oil	Natural Gas	Coal	Electricity
Upstream (E&P)	• Joint oil development/ Equity participation	• Joint gas development / Equity participation • Unconventional gas development	• Joint coal development in the Russian Far East and in Mongolia	• Joint construction of electricity supply facility (e.g. power plant and transmission grid) • Joint renewable energy development
Midstream	• Construction/ expansion of oil pipeline between Russia – China – DPRK • Commercial use of the Arctic Route	• Construction of inter-state gas pipeline networks (China-Russia, Japan-Russia, Russia-China- ROK, Russia-DPRK-ROK) • Participation in liquefaction facility in Russia • Commercial use of the Arctic LNG	• Construction/ upgrade of railway/ports for transporting coal • Railway connection between Russia and two Koreas.	• Asian Super Grid (China-Russia, Japan-Russia, Russia-Mongolia, ROK-China, ROK-Japan, China-Mongolia) • Power interconnection among two Koreas and Russia
Downstream	• Refinery construction • Petroleum product trades	• Enter the market of city gas business	• Clean coal, CTL technology	• Power end-use efficiency

Source: Lee, Sung-kyu, 2014. Challenges and Opportunities of NEA Energy Integration: Korea's Perspective

Opportunity for Russia's Regional Energy Cooperation

- **Oil, Gas and Coal Development Projects**
  - **Oil, Gas (Sakhalin-III, Chayanda, Yamal), and Coal (Yakutia)**
- **Gas Pipeline Networks for Export**
  - **Power of Siberia Projects to export natural gas to NE Asian countries.**
  - **Potential exceeds 150 Bcm/y: 76 Bcm/y by pipe to China and 76 Bcm/y of LNG exports by 2030.**
  - **Power of Siberia (PS) Pipeline will begin supplying gas on 20 Dec. 2019.**
- **Completion of the ESPO Oil Pipeline Construction**
- **Development of Oil & Gas in Arctic Ocean Area (Yamal region)**
  - **Natural gas exports to Asia-Pacific Region by pipelines or LNG**

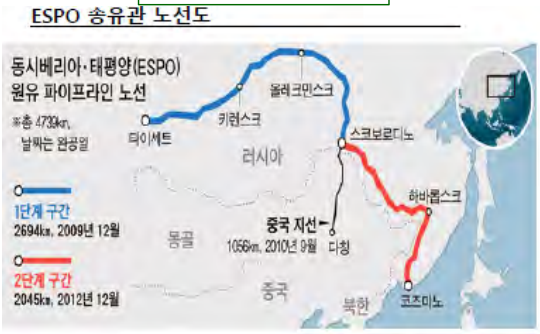
⇒ **Russia's Diversification of the Energy Export Market to the Asia-Pacific**

Power of Siberia

북극해 항로 Arctic LNG Routes

Cross-border Energy Trading Infrastructure Projects in NE Asia

ESPO Oil Pipeline



UGSS

Asian Super Grid

NEA Power Interconnection: HVTL

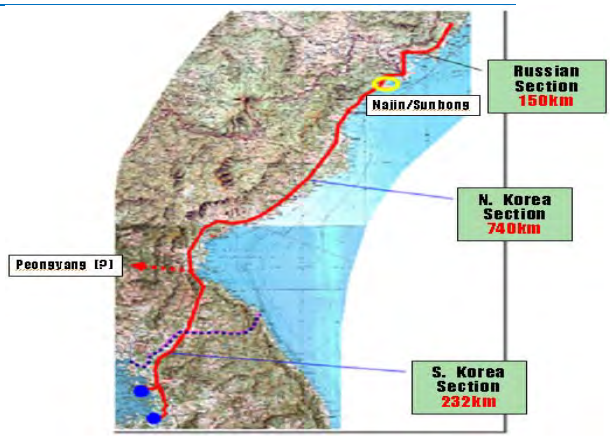
Slow Progress of Regional Energy Projects: Why?

- **Geopolitics: Historical inertia + Security concerns**
  - **Sino-Japan, Japan-Russia relations: Territorial disputes**
  - **Korean Peninsular Security Issues: Political uncertainty and Nuclear issue in North Korea**

  ⇒ **Critical necessary condition for project security**
  - **Limited cross-border energy transportation networks**
- **High capital requirement for energy development projects**
  - **Resource-rich countries (Russia) ≠ Capital-rich countries (China, Japan, Korea)**
- **Project/Market uncertainty for energy exporting countries**
  - **Sanction on Russia and Resource Nationalism: Political barrier against foreign investment**
- **Rivalry in energy diplomacy and energy hegemony competition**
  - **Conflict between multilateral *vs* bilateral relationships**
- **Differences in market compatibility**
- **Lack of multilateral mechanism for regional energy cooperation**
- **Competitiveness of Russian pipeline gas ↓ w.r.t other LNG sources**
  - **Shale gas production in North America ↑**
  - **LNG exports from Australia, Middle East & Yamal ↑**

Energy Cooperation Project with DPRK

- **Gas Supply from Russia to DPRK and ROK**
  - **Gas pipeline to supply of 10bcm(7.5 million ton) to ROK *via* DPRK**
  - **Agreed in 2008**
  - **Suspended in 2011 after the death of Kim Jong Il**
- **Power Interconnection between Russia, DPRK & ROK**
  - **Feasibility study (2009 ~)**
  - **Suspended due to the UN sanction on DPRK after the nuclear test.**
- **KEDO (Korean Peninsular Energy Development Organization)**
  - **Established based on US-DPRK's agreement in 1995**
  - **To construction of two LWR nuclear power plants of 2 GW and supply HFO to DPRK for the compensation of denuclearization of the DPRK**
  - **Stopped construction of 2 LWR in 2003: Construction process of 34 % with investment of US$ 1.14 billion by ROK, US$ 0.41 billion by Japan**
  - **Terminated in June 2006.**
- **Energy agenda in the Six party Talk**
  - **Joint Statement (Sep, 2005): Proposal of power supply of 2 GW by Korean government to replace the KEDO's two LWRs**



Gas MoU between Russia/DPRK in Sep. 2011

Feasible Energy Projects after Denuclearization in DPRK

- **Energy Assistance: Humanitarian aids for supply of energy products for civilian use**
  - **Oil products: LPG, kerosene, diesel, gasoline**
  - **Heavy fuel oil and coal for power generation**
  - **Power supply to a limited area (eg, Gaesung)**
- **Power Interconnection with ROK, Russia and China**
  - **Russia's proposal to supply of power to DPRK: Size 500 MW, Distance 380 km, Capital cost US$ 180 million**
- **Natural gas pipeline projects from Russia**
  - **Multilateral cross-border projects with Russia, DPRK, and ROK subject to the availability of resource in Russia**
- **Renovation/re-construction of existing energy production facilities:**
  - **Coal mines, refineries, power plants, transmission/distribution systems**
  - **Technical, financial and experts assistances**
- **Capacity building: to provide with training/education programs for energy planning/ implementation**
- **Resuming the construction of two LWRs of the KEDO ?**

Creation of Environment for Energy Cooperation with DPRK

- **DPRK should accept demand from the international community for security concerns transparently**
  - **Dismantling nuclear weapon programs**
  - **De-coupling the energy issues from the politics**
- **DPRK's Access to the membership of the IFO**
  - **International Monetary Fund (IMF), other international financing organizations (WB, ADB), and multilateral energy cooperation bodies**
- **Multilateral approach with the countries in Northeast Asia and other developed countries in reconstructing the energy system in DPRK**
  - **Promoting active regional/international cooperation for**
    - **rehabilitation of the existing energy facilities**
    - **expansion of energy system , and**
    - **accommodating foreign investments.**

Promoting Regional Energy Cooperation in NEA

- **Roadmaps towards for multilateral energy cooperation in NEA**
  - **The short term agenda, to be implemented urgently as soft policy agenda in non-binding manners, include:**
    - **Establishment of policy dialogues channel between governments in the NEA region for creating confidence building environment**
    - **Promotion of information/data exchange and sharing mechanisms**
    - **Joint research/study with identification of possible cooperative energy projects: Natural gas pipelines, power interconnection, oil stockpiling**
    - **Capacity building projects for developing countries in the region**
    - **Encourage energy expert/business dialogues & participation**
    - **Assistance to/cooperation with the DPR Korea for resolution of energy shortage problem**
  - **The long term agenda, which require a consensus as well as more preparatory joint efforts between the countries in NEA, include:**
    - **Creation of institutionalized frameworks for multilateral regional energy cooperation by enacting a treaty,charter, regional energy community at the regional basis**
    - **Introduction of policy coordination functions with the established institutional arrangement**
    - **Development of joint policy agenda for common goals/task sharing**
    - **Address on an intra-regional energy financing mechanisms**

Conclusion

- **Denuclearization of the DPRK will enhance opportunity to facilitate energy cooperation in Northeast Asia at the regional level;**
  - **It will significantly reduce or remove political/project risks impeding investments to cross-border energy transportation infrastructures in the region.**
  - **Feasible energy projects after DPRK's denuclearization include;**
    - **Power interconnection with Russia – China – DPRK – ROK – Japan,**
    - **Inter-state networks to transport/trade natural gas among the countries in the region,**
- **DPRK will also be able to gain the benefit to recover from the energy supply crisis by participating regional energy cooperation projects;**
  - **Multilateral approach will be required at the regional level to implement the energy project assistance to the DPRK.**
  - **Reconstruction of the energy system in DPRK as well as in the Korean peninsular.**

⇒ **Regional energy cooperation will eventually contribute to the establishment of peace mechanism in Northeast Asia.**

Thank you very much

- End -